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EXAMINER
BITAR, NANCY

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 June 2008</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-13</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-5 and 11-13</u> is/are rejected.

7)☒ Claim(s) <u>6-10</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>30 June 2008</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☒ All b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's response to the last Office Action, filed 06/30/2008, has been entered and made of record.

2.   Applicant has amended claims 2-4, 6, 9-10, 12-13. Claims 1-13 are currently pending.

3.   Applicant has amended the abstract therefore; the objection for the abstract has been withdrawn.

4.   Applicant has amended figure 4 to include the labels .The drawing objection has been withdrawn.

5.   Applicants arguments filed 06/30/2008 have been fully considered but they are not persuasive.

6.   Applicant argues that Netsch teaches a method of registering two three-dimensional images. However, it is respectfully submitted that Netsch performs this registration in a completely different way than the current system. Netsch performs a local correlation of grey-values of the images (see, page 719, section 2.1) by analyzing edges in the images and searching for a local correlation among a small group of image voxels. Voxels are selected by looking for image grey values that have a largest variance among neighboring voxels (see section 2.2). Additionally Netsch does not utilize Hermite Transforms to perform a similarity measure. Although Haddad is cited for showing Hermite Transforms, the Hermite Transforms of Haddad are applied merely for image coding. Moreover, Applicant argues that the system of claim 1 id not anticipated or made obvious by the teaching of Netsch in view of Haddad.

7.   In response, Examiner believes that the local correlation of Netsch is the same way as

taught in the specification paragraph [0017]. Netsch teaches a local correlation among a small

group of image voxels since Netsch teaches a 3D image registration that consists in looking for

the non-rigid transformation of one image that will result in the largest possible value of the sum

of the local correlation over pairs of corresponding window in the two images where a similarity

measure is calculated from the grey values of both images (see section 2 and 2.1).Moreover, the

claim does not recite that the system does not use a local correlation therefore the Netsch

reference teaches the computation of the local correlation function. In response to applicant's

argument that there is no suggestion to combine the references, the examiner recognizes that

obviousness can only be established by combining or modifying the teachings of the prior art to

produce the claimed invention where there is some teaching, suggestion, or motivation to do so

found either in the references themselves or in the knowledge generally available to one of

ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In

re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Haddad reference is

introduced to show the Hermite transformation not only for purpose of reduction in data

transmission but also to facilitate the implementation and involves easier algorithm (see figure

7). Therefore, the examiner used Haddad reference as a secondary references and made it

obvious to use Haddad Hermite transformation and the inverse Hermite transformation as taught

on pages (1409-1410) which can be used on the 3-D transformation of Netsch in order to

compute the correlation and determine the best matching transformation in real time application.

All remaining arguments are reliant on the aforementioned and addressed arguments and thus are

considered to be wholly addressed herein.

Examiner Notes

8.   Examiner cites particular columns and line numbers in the references as applied to the

claims below for the convenience of the applicant. Although the specified citations are

representative of the teachings in the art and are applied to the specific limitations within the

individual claim, other passages and figures may apply as well. It is respectfully requested that,

in preparing responses, the applicant fully consider the references in entirety as potentially

teaching all or part of the claimed invention, as well as the context of the passage as taught by

the prior art or disclosed by the examiner

Claim Rejections - 35 USC § 112

9.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

        The specification shall conclude with one or more claims particularly pointing out and

        distinctly claiming the subject matter which the applicant regards as his invention.

10.   Claims 4-5 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing

to particularly point out and distinctly claim the subject matter which applicant regards as the

invention. Claim 4 recites the limitation "wherein the class of simultaneous transformation" in

claim 1. There is insufficient antecedent basis for this limitation in the claim. Claim 5 depends

on claim 4 therefore, it is also indefinite.

Claim Rejections - 35 USC § 103

11.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or
> described as set forth in section 102 of this title, if the differences between the subject
> matter sought to be patented and the prior art are such that the subject matter as a whole
> would have been obvious at the time the invention was made to a person having ordinary
> skill in the art to which said subject matter pertains. Patentability shall not be negatived
> by the manner in which the invention was made.

12.   Claims 1-3, 11- 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Netsch et al (Towards real time Multi-modality 3-D medical image registration, IEEE 2001) in

view of Haddad et al (A new orthogonal transform of signal coding, IEEE 1988)

        As to claims 1-3 , Netsch et al teaches an image processing system, for correlating

shapes in multi -dimensional images (m-D), comprising image data processing means for

estimating a similarity measure (similarity measure calculated from the grey-values of both

images, paragraph 1, page 718) including computing means for: estimating two image signals

(f(x), g(y)) representing shapes defined in respective windows (W1, W2) in two multi -

dimensional image (3D medical image registrations, note that the registration consists in looking

for the transformation of one image that will result in the largest possible value of the sum of

such "Local Correlations" over pairs of corresponding windows in the two images, see section

2.1) ; using a Hermite Transform (HT) applied to both said image signals (the registration

transformation is determined by iteratively optimizing a similarity measure calculated from the

grey values of both images, see abstract, page 718) for performing an evaluation of two first sets

of scalar valued Hermite coefficients (f.sub.l, g.sub.l, F.sub.l, G.sub.l), from which a

combination yields a transformed set of scalar valued Hermite coefficients [K.sub.l] (derivative

of t with respect to pl is calculated as the scalar product of image gradients with respect to 2, y

and z and the partial derivative of the transformation T with respect to pl at position (z,y , z)in~

the 3-D image space, see section 4.2, page 721, and figure 1; applying the inverse Hermite

Transform (HT.sup.-1) to the transformed set of scalar valued Hermite coefficients [K.sub.l] to

achieve the computation of a windowed correlation function (K(v)) (the target t can be

reformatted according to the inverse translation and rotation parameters r-', see paragraph 1,

section 4.3, page 722) ; and estimating the maximum of said windowed correlation function as

the wanted similarity measure to correlate the shapes (see section 2.1) ; and means for

displaying the correlated shapes and/or processed images(see figure 2).While Netsch et al meets

a number of the limitations of the claimed invention, as pointed out more fully above, Netsch et

al fails to specifically teach the Hermite transformation. Specifically, Haddad et al. teaches the

use orthogonal transform for signal coding where with the use of Hermite transformation where

he MHT algorithm requires only 2N real multiplications or divisions for a transformation of a

signal block of N samples. The MHT algorithm is also used for the inverse transformation,

IMHT. The MHT algorithm makes this new transform very attractive. It is efficient

computationally and comparable to the industry standard, the DCT, for the source models with

positive correlation coefficients; it is somewhat better than the DCT for negative correlation

coefficients (see abstract). It would have been obvious to one of ordinary skill in the art to use

the Hermite transformation in registration transformation of Netsch et al. in order to help in the

negative correlation thus requiring easier numerical algorithm source thus getting accurate and

robust results from the images being compared and faster registration. Therefore, the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention by applicant.

Claim 11 differ from claim 1 only in that claim 11 is a method claim whereas; claim 1 is an apparatus claim. Thus, claim 11 is analyzed as previously discussed with respect to claim 1 above.

The limitation of claim 12 is taught by Netsch (The images are acquired simultaneously with a multi-slice dual contrast TFE sequence on an image matrix of size 2562 x 64, section 5.2)

Claim 13 differ from claim 1 only in that claim 13 is a computer program claim whereas; claim 1 is an apparatus claim. Thus, claim 13 is analyzed as previously discussed with respect to claim 1 above.

Allowable Subject Matter

13.   Claims 6 -10 are   objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to NANCY BITAR whose telephone number is (571)270-1041.

The examiner can normally be reached on Mon-Fri (7:30a.m. to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Jinge Wu can be reached on 571-272-7429. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

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information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Nancy Bitar   08/20/2008

/Samir A. Ahmed/

Supervisory Patent Examiner, Art Unit 2624